Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE
APPARATUS EMPLOYING PASSIVE MATRIX, etc. **NEW SHEET** Sheet 1 of 26

(PRIOR ART)

BIT LINES

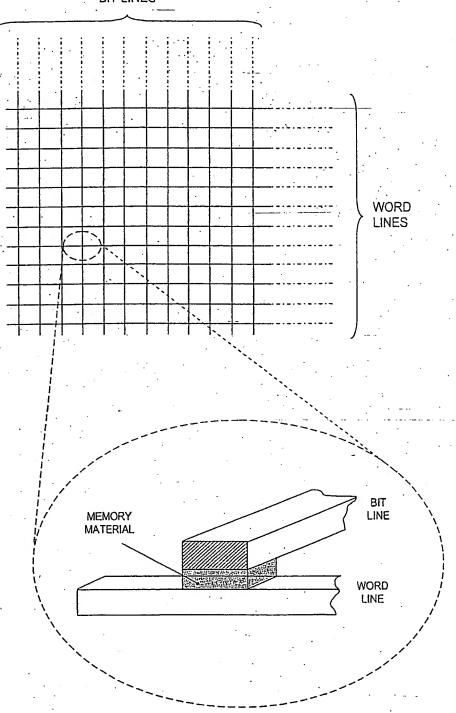
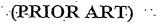


FIG. 1

App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 2 of 26



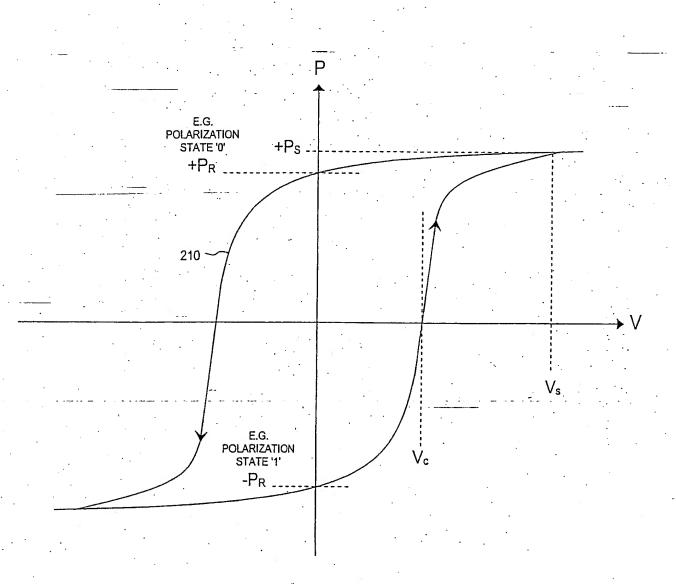


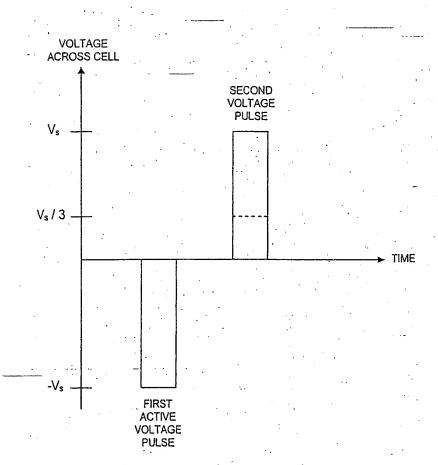
FIG. 2

Docket No.: 3672-0199PUS1.

App No.: NEW
Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE
APPARATUS EMPLOYING PASSIVE MATRIX, etc.
NEW SHEET
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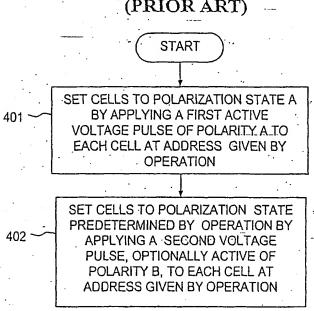
Sheet 3 of 26

(PRIOR ART)



App No.: NEW Docket No.: 3672-0199PUS1
Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE
APPARATUS EMPLOYING PASSIVE MATRIX, etc.
NEW SHEET Sheet 4 of 26

(PRIOR ART)



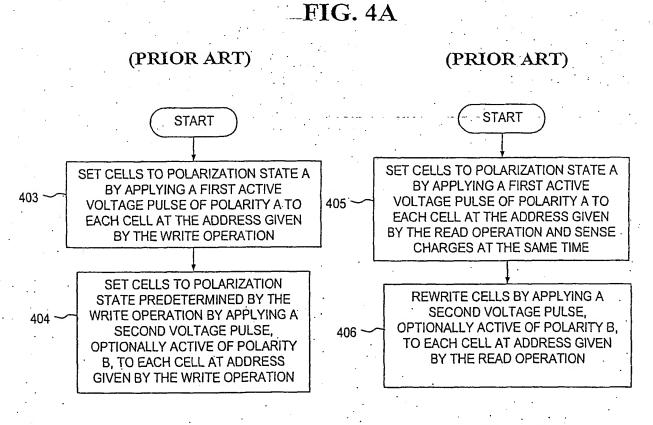


FIG. 4B

FIG. 4C

App No.: NEW Inventor: Per HAMBERG et al.

Docket No.: 3672-0199PUS1

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET

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(PRIOR ART)

BIT LINES WORD LINES

DATA WORD

App No.: NEW

Inventor: Per HAMBERG et al.

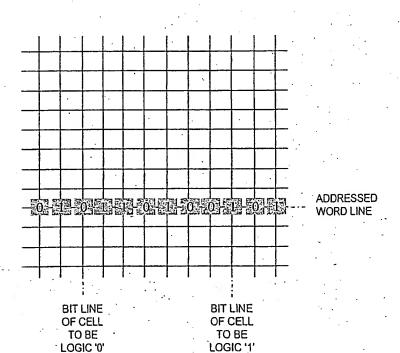
Docket No.: 3672-0199PUS1

Title: METHOD FOR OPERATING A DATA STORAGE

APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 6 of 26

(PRIOR ART)



DATA WORD ON ADDRESSED WORD LINE AFTER **EXECUTION OF OPERATION** -

50; 31 (O) 11 M 50) 01 50; 30 M 50 M

Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STO

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 7 of 26

(PRIOR ART)

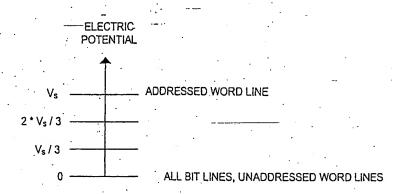


FIG. 7A

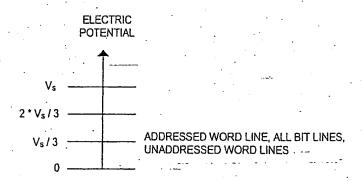


FIG. 7B

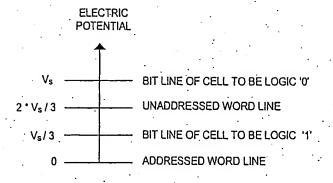


FIG. 7C

Title: METHOD FOR OPERATING A DATA STORAGE

APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 8 of 26

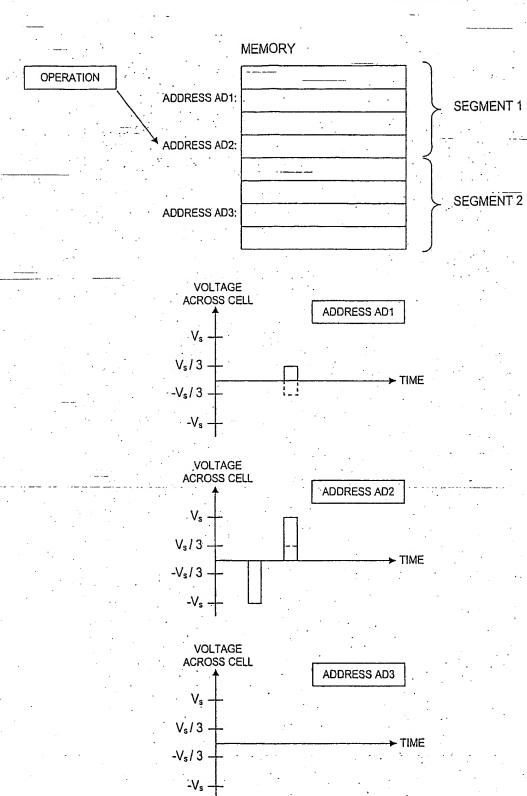
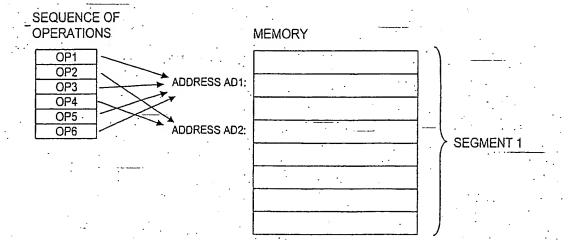


FIG. 8

Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 9 of 26



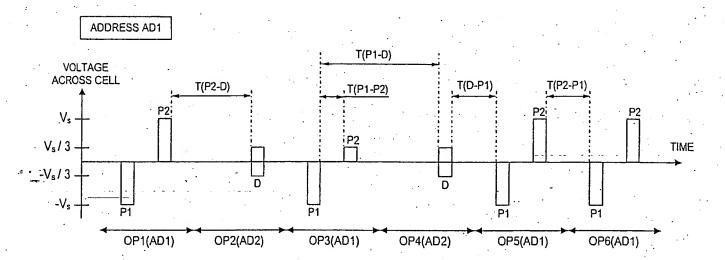


FIG. 9

App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 10 of 26

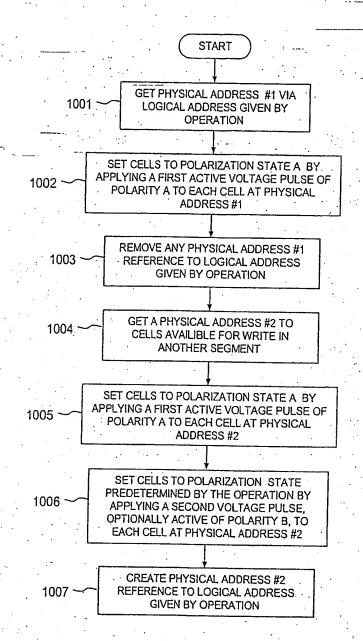


FIG. 10

App No.: NEVV Docket No.: 3672-0 Inventor: Per ! HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS: EMPLOYING PASSIVE MATRIX, etc. Docket No.: 3672-0199PUS1 NEW SHEET :

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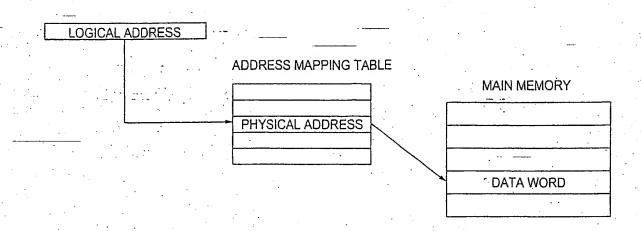


FIG. 11A

•				
LOGICAL ADDRE	SS	* ·	A	
. 1	ADDRESS MAPPING	TABLE		
	·			
میکنده در در مرحم اما اساس است رسامید، آیایت و اسا			NON-VOLATILE M	MAIN MEMORY
•	PHYSICAL ADDRESS		NON-VOLATILE IV	IAIN WEWORT
			DATA REGION	META DATA REGION
-	*		. ,	
	*			
			¥	
			DATA	LOGICAL ADDRESS

FIG. 11B

App No.: NEW

Inventor: Per HAMBERG et al.

Docket No.: 3672-0199PUS1

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET

Sheet 12 of 26

•	PHYSICAL ADDRESS	'PRE-SET' MARK	· 'PRE-SET POLARIZATION A' MARK	SEGMENT REFERENCE]
---	------------------	-------------------	---------------------------------------	----------------------	---

FIG. 12

SEGMENT REFERENCE	NUMBER OF PRE- SET CELL ADDRESSES	TIMESTAMP OF LAST SEGMENT ACCESS	'LOCK STATE' MARK		,
	•			PHYSICAL	'PRE-SET
		•		ADDRESS ADX	POLARIZATION A' MARK
	•	•		PHYSICAL	'PRE-SET
			<u> </u>	ADDRESS ADY	POLARIZATION A' MARK

FIG. 13

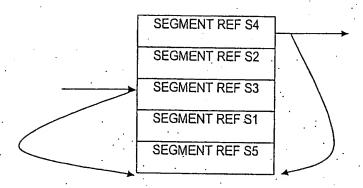


FIG. 14

App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 13 of 26

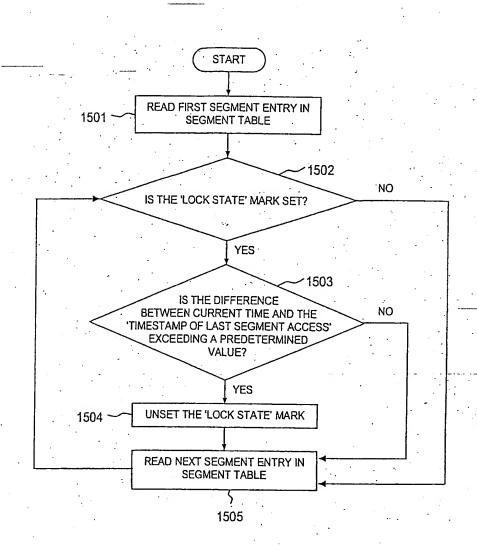
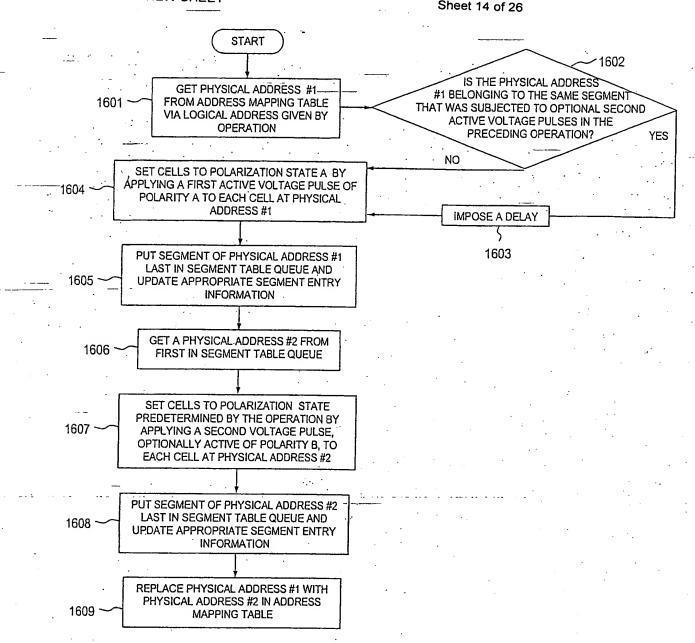


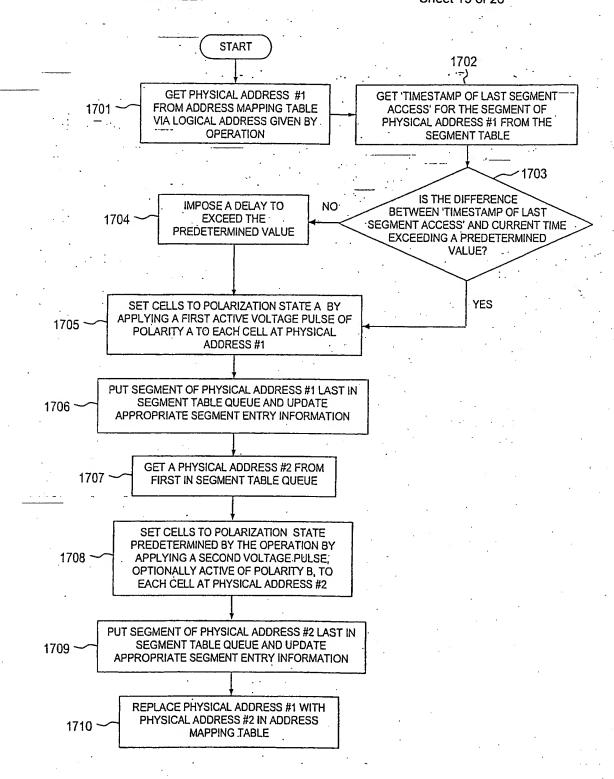
FIG. 15

App No.: NEW Docket No.: 3672-0199PUS1
Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATE of the second seco

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc. NEW SHEET



App No.: NEW Docket No.: 3672-0199PUS1
Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE
APPARATUS EMPLOYING PASSIVE MATRIX, etc.
NEW SHEET Sheet 15 of 26



App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.
NEW SHEET Sheet 16 of 26

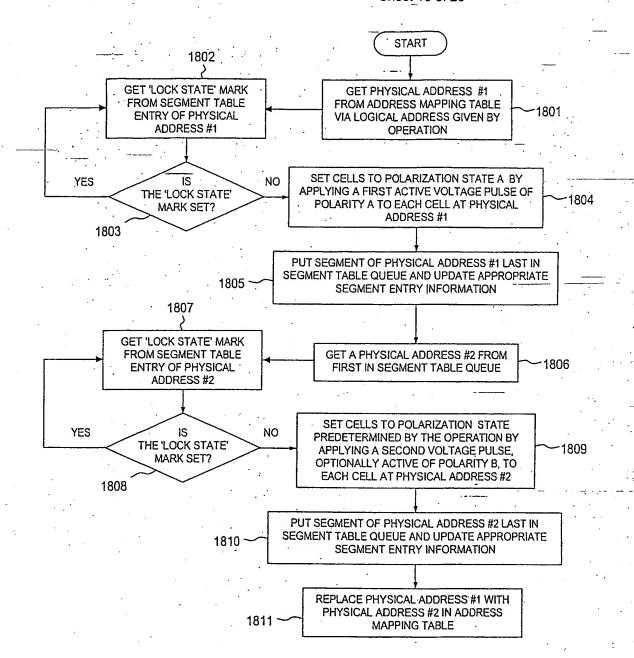


FIG. 18

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc. **NEW SHEET** Sheet 17 of 26 START **GET PHYSICAL ADDRESS #1** FROM ADDRESS MAPPING TABLE 1901 VIA LOGICAL ADDRESS GIVEN BY **OPERATION** SET CELLS TO POLARIZATION STATE A BY APPLYING A FIRST ACTIVE VOLTAGE PULSE OF 1902 POLARITY A TO EACH CELL AT PHYSICAL ADDRESS #1 PUT SEGMENT OF PHYSICAL ADDRESS #1 LAST IN SEGMENT TABLE QUEUE AND UPDATE 1903 APPROPRIATE SEGMENT ENTRY INFORMATION GET A PHYSICAL ADDRESS #2 FROM 1904 FIRST IN SEGMENT TABLE QUEUE YES IS THE CONSEQUTIVE OPERATION GET NEW PHYSICAL ADDRESS #2 ADRESSING THE SAME SEGMENT AS PHYSICAL FROM NEXT SEGMENT IN SEGMENT TABLE QUEUE ADDRESS #2? 1905 NO . :... 1906 GET 'LOCK STATE' MARK FROM SEGMENT TABLE 1907 ENTRY OF PHYSICAL ADDRESS #2 1909 SET CELLS TO POLARIZATION STATE NO YES PREDETERMINED BY THE OPERATION BY THE 'LOCK STATE' APPLYING A SECOND VOLTAGE PULSE. MARK SET? OPTIONALLY ACTIVE OF POLARITY B, TO EACH CELL AT PHYSICAL ADDRESS #2 1908 PUT SEGMENT OF PHYSICAL ADDRESS #2 LAST IN SEGMENT TABLE QUEUE AND UPDATE 1910 APPROPRIATE SEGMENT ENTRY INFORMATION REPLACE PHYSICAL ADDRESS #1 WITH PHYSICAL ADDRESS #2 IN ADDRESS -1911 MAPPING TABLE

Docket No.: 3672-0199PUS1

App No.: NEW

Inventor: Per HAMBERG et al.

FIG. 19

NEW SHEET Sheet 18 of 26 **START** 2002 IS THE PHYSICAL ADDRESS **GET PHYSICAL ADDRESS #1** #1 BELONGING TO THE SAME SEGMENT FROM ADDRESS MAPPING TABLE THAT WAS SUBJECTED TO OPTIONAL SECOND 2001 VIA LOGICAL ADDRESS GIVEN BY ACTIVE VOLTAGE PULSES IN THE **OPERATION** PRECEDING OPERATION? YES NO SET CELLS TO POLARIZATION STATE A BY APPLYING A FIRST ACTIVE VOLTAGE PULSE OF 2004 POLARITY A TO EACH CELL AT PHYSICAL ADDRESS #1 IMPOSE A DELAY 2003 PUT SEGMENT OF PHYSICAL ADDRESS #1 LAST IN SEGMENT TABLE QUEUE AND UPDATE APPROPRIATE SEGMENT ENTRY 2005 **INFORMATION** GET A PHYSICAL ADDRESS #2 FROM 2006 FIRST IN SEGMENT TABLE QUEUE 2007 IS THE 'PRE-SET POLARIZATION A' MARK OF PHYSICAL ADDRESS #2 SET? NO YES SET CELLS TO POLARIZATION STATE SET CELLS TO POLARIZATION STATE PREDETERMINED BY THE OPERATION BY PREDETERMINED BY THE OPERATION BY APPLYING A SECOND VOLTAGE PULSE, APPLYING A SECOND VOLTAGE PULSE, 2009 OPTIONALLY ACTIVE OF POLARITY A, TO OPTIONALLY ACTIVE OF POLARITY B, TO EACH CELL AT PHYSICAL ADDRESS #2 EACH CELL AT PHYSICAL ADDRESS #2 2008 PUT SEGMENT OF PHYSICAL ADDRESS #2 LAST IN SEGMENT TABLE QUEUE AND **UPDATE APPROPRIATE SEGMENT** 2010 **ENTRY INFORMATION** REPLACE PHYSICAL ADDRESS #1 WITH 2011 PHYSICAL ADDRESS #2 IN ADDRESS MAPPING TABLE

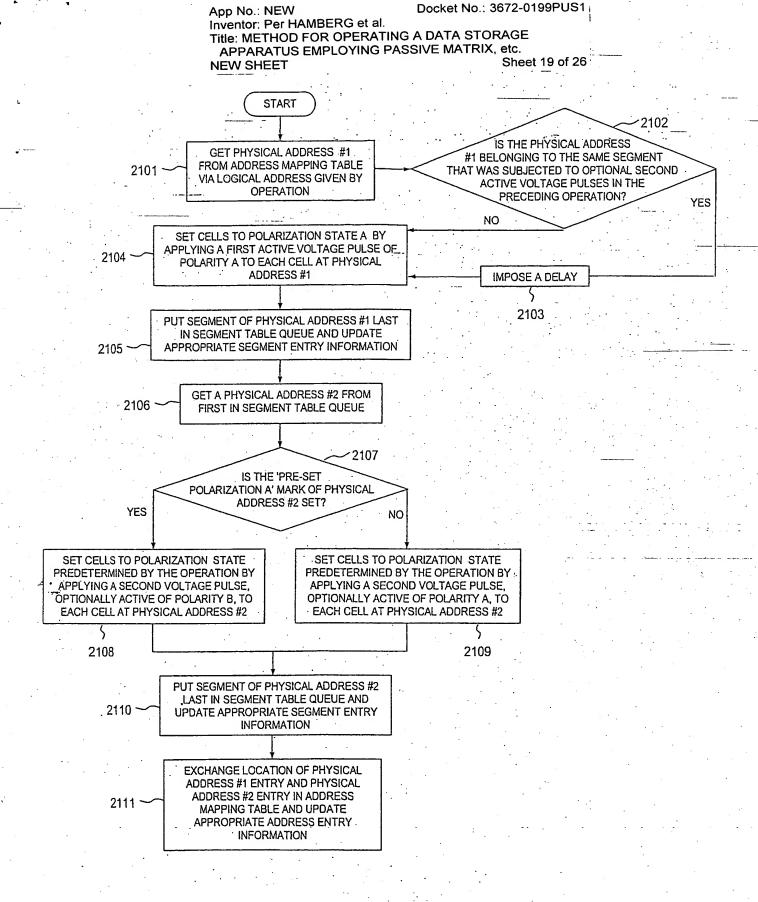
Docket No.: 3672-0199PUS1

App No.: NEW

Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

FIG. 20



App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.
NEW SHEET Sheet 20 of 26

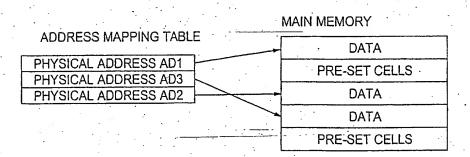


FIG. 22A

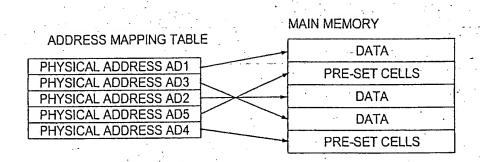


FIG. 22B

Inventor: Per HAMBERG et al.

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

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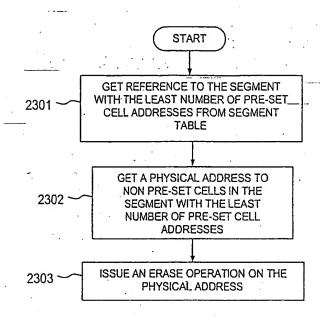


FIG. 23

App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al. Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc. **NEW SHEET** Sheet 22 of 26 START GET REFERENCE TO THE SEGMENT WITH THE LEAST NUMBER OF PRE-SET 2401 CELLS FROM SEGMENT TABLE GET PHYSICAL ADDRESS TO NON PRE-SET CELLS IN THE 2402 SEGMENT WITH THE LEAST NUMBER OF PRE-SET CELL ADDRESSES GET A LOGICAL ADDRESS FROM ADDRESS MAPPING TABLE VIA 2403 PHYSICAL ADDRESS GET ANOTHER PHYSICAL ADDRESS NO TO NON PRE-SET CELLS IN THE IS THE LOGICAL ADDRESS FREE? SEGMENT WITH THE LEAST NUMBER OF PRE-SET CELL 2404 **ADDRESSES** YES 2405 SET CELLS TO POLARIZATION STATE A BY 2406 ~ APPLYING A FIRST ACTIVE VOLTAGE PULSE OF POLARITY A TO EACH CELL AT PHYSICAL **ADDRESS**

FIG. 24

UPDATE APPROPRIATE ADDRESS ENTRY

INFORMATION IN ADDRESS MAPPING TABLE

PUT SEGMENT OF PHYSICAL ADDRESS LAST IN SEGMENT TABLE QUEUE AND

UPDATE APPROPRIATE SEGMENT ENTRY INFORMATION

INCREASE TOTAL NUMBER OF PRE-SET CELL

ADDRESSES BY ONE

2407

2408

2409

App No.: NEW Docket No.: 3672-0199PUS1 Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.
NEW SHEET Sheet 23 of 26

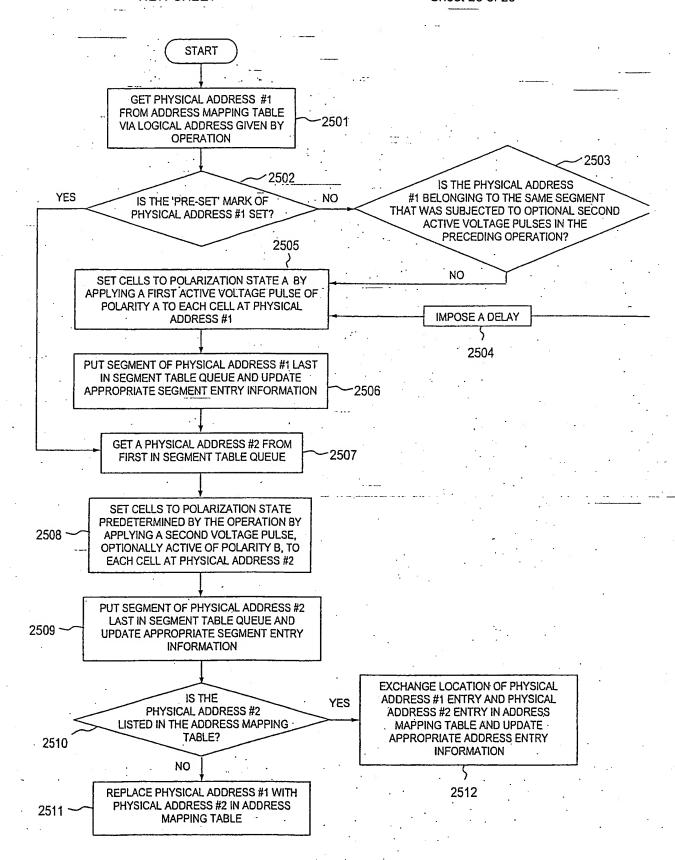


FIG. 25

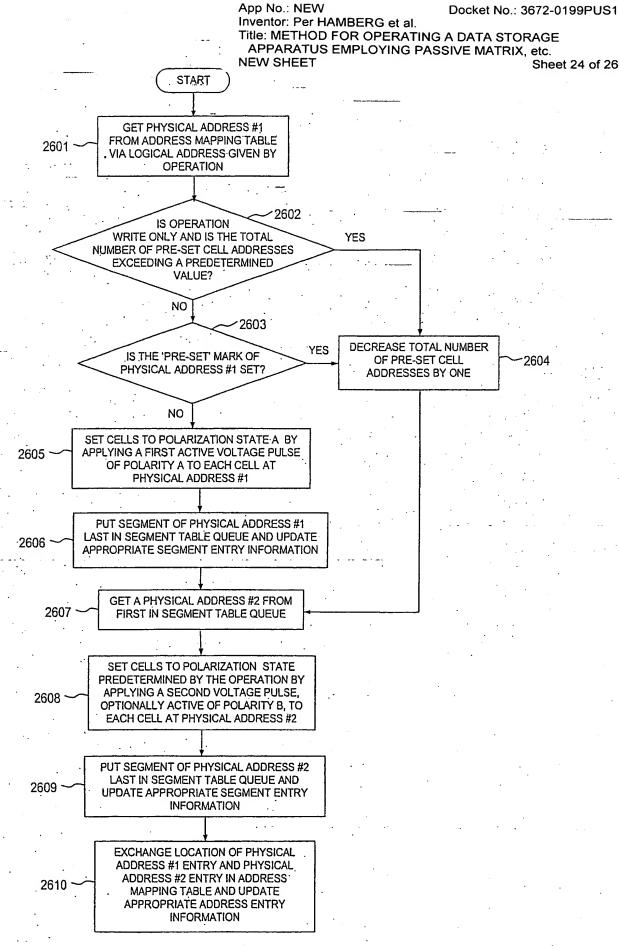


FIG. 26

Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc. **NEW SHEET** Sheet 25 of 26 **START GET PHYSICAL ADDRESS #1** FROM ADDRESS MAPPING TABLE 2701 VIA LOGICAL ADDRESS GIVEN BY **OPERATION** 2703 2702 YES NO IS THE 'PRE-SET' MARK OF GET A PHYSICAL ADDRESS #2 FROM PHYSICAL ADDRESS #1 SET? FIRST IN SEGMENT TABLE QUEUE 2705 2704 SET CELLS TO POLARIZATION STATE A BY OPERATION WRITE ONLY NÖ APPLYING A FIRST ACTIVE VOLTAGE PULSE AND THE PRE-SET CELLS AT PHYSICAL OF POLARITY A TO EACH CELL AT ADDRESS #2 LISTED IN THE PHYSICAL ADDRESS #1 ADDRESS MAPPING TABLE? PUT SEGMENT OF PHYSICAL ADDRESS #1 YES LAST IN SEGMENT TABLE QUEUE AND UPDATE APPROPRIATE SEGMENT ENTRY INFORMATION GET A PHYSICAL ADDRESS #2 FROM FIRST IN SEGMENT TABLE QUEUE SET CELLS TO POLARIZATION STATE PREDETERMINED BY THE OPERATION BY APPLYING A SECOND VOLTAGE PULSE, 2708 OPTIONALLY ACTIVE OF POLARITY B, TO EACH CELL AT PHYSICAL ADDRESS #2 PUT SEGMENT OF PHYSICAL ADDRESS #2 LAST IN SEGMENT TABLE QUEUE AND 2709 UPDATE APPROPRIATE SEGMENT ENTRY INFORMATION **EXCHANGE LOCATION OF PHYSICAL** IS THE ADDRESS #1 ENTRY AND PHYSICAL YES ADDRESS #2 ENTRY IN ADDRESS PHYSICAL ADDRESS #2 MAPPING TABLE AND UPDATE LISTED IN THE ADDRESS MAPPING APPROPRIATE ADDRESS ENTRY TABLE? 2710 INFORMATION NO 2712 REPLACE PHYSICAL ADDRESS #1 WITH PHYSICAL ADDRESS #2 IN ADDRESS 2711 MAPPING TABLE

App No.: NEW

Inventor: Per HAMBERG et al.

Docket No.: 3672-0199PUS1

FIG. 27

Docket No.: 3672-0199PUS1

App No.: NEW
Inventor: Per HAMBERG et al.
Title: METHOD FOR OPERATING A DATA STORAGE APPARATUS EMPLOYING PASSIVE MATRIX, etc.

NEW SHEET Sheet 26 of 26

ADDRESS BUS MEMORY CONTROL COMMAND UNIT MAIN MEMORY UNIT(S) DATA BUS

FIG. 28

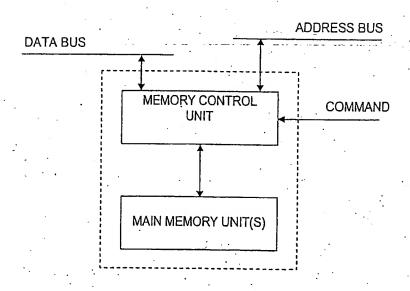


FIG. 29